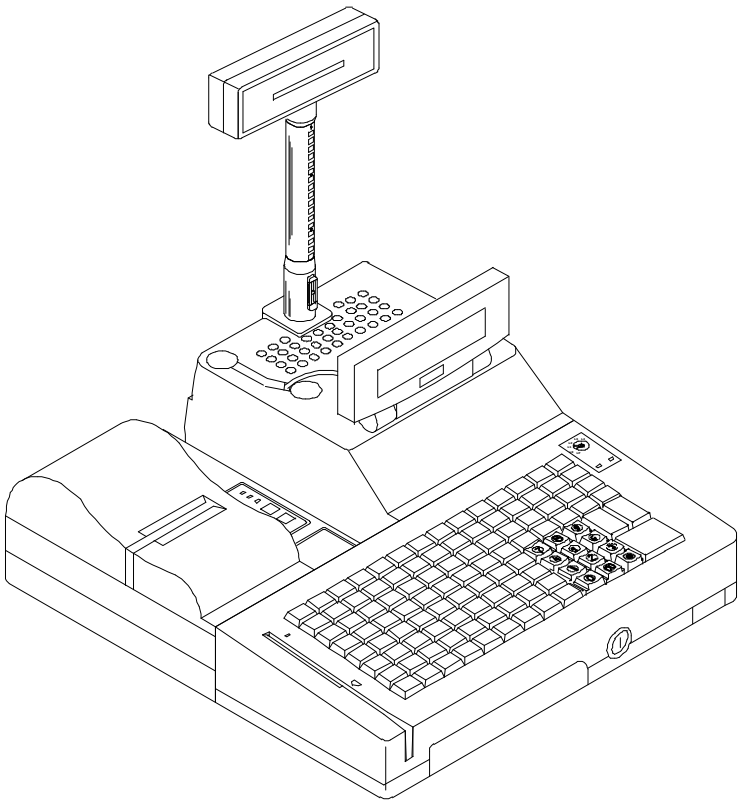
POSIFLEX™

PST-1000 SERIES

TECHNICAL MANUAL

Rev. : A



SOME IMPORTANT NOTES

FCC NOTES

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with limits for a Class A digital device pursuant to subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures to correct the interference.

WARRANTY LIMITS

Warranty will terminate automatically when the machine is opened by any person other than the authorized technicians. The user should consult his/her dealer for the problem happened. Warranty voids if the user does not follow the instructions in application of this merchandise. The manufacturer is by no means responsible for any damage or hazard caused by improper application.

ABOUT THIS MANUAL

This manual assists the user especially the software programmer who provides the software system for POS application to utilize the hardware of the PST1000 series that is a member of the POSIFLEX integrated point-of-sale terminal product family. The PST1000 is a compact point-of-sale system that gives the most user friendly upgrade transition from ECR and combines the performance and affordability of personal computers with the elegance and reliability of business machine. The PST1000 also provides the built-in networking capability for easy communication among multiple terminals in addition to the data transfer and control through back office server.

The manufacturer of the PST1000 series heartily apologizes to the user for reserving the right to change or to modify this manual without notice due to the rapid and constant progress and improvement on science and technology. The user may always obtain the most up to date information through our web site: http://www.mustekposiflex.com.tw or http://www.posiflex.com.tw

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OVERVIEW

SCOPE

The PST1000 series is a series of fully integrated PC based point-of-sale terminals. This series provides the most user-friendly environment for ECR upgrade with its powerful capability from PC. This series also provides a powerful programmable keyboard with 112 key-sites of a comfortable size 18 x 22 mm in 8 x 14 matrix and a 6 position control key which is capable of sending answer back codes according to the position of the key.

FEATURES

- Highest security for business machine
- Greatest User's convenience and easiest software programming
- Highest profitability for end users
- Best compatibility and flexibility to any hardware / software application
- Highest performance in most compact size point-of-sale system
- Most cost effective with top quality, reliability and serviceability of point-of-sale system at reasonable price
- Powerful programming ability (hot key programming, programming under Windows, multiple page, multiple level, whole range key content, time delay, position sense answer back code covering most ECR functions, etc.)
- **Built-in UPS function** to support the system from intermittent power failure
- **Accidental power off protection** – only power on or software controlled power off function accessible from exterior of the system. This feature, together with the UPS function, provides a data-loss-free environment.

MODEL NUMBERS

Customer Display / Operator (Cashier) Display	OPTIONAL CUSTOMER DISPLAY: PD-101, PD-201 or PD-2101 or PD-7001 series
9” monochrome CRT DISPLAY	PST1010
OD-300 -- 2 * 20 LCD DISPLAY	PST1000

GENERAL SPECIFICATION

SYSTEM

- CPU speed : 486DX4-100
- 4 MB DRAM (expandable to 32 MB max. option)
- 3.5” FDD 1.44 MB
- Built-in IDE interface supports up to mode 4
- Two half-length ISA expansion slots and one half-length PCI expansion slot for the model without CRT display. One (ISA) slot will be occupied if the CRT display is used.
- DCI Technology for best compatibility of input devices

Non-volatile Solid State memory 2MB with HDD emulation (expandable to 16 MB max. option)

POWER SOURCE

Item	Specification
High range of voltage input	180 ~ 264 Vac
Low range of voltage input	90 ~ 130 Vac
Input frequency	47 ~ 63 Hz

Power consumption of 9” mono CRT types: 43W nom., 52W max..

Power consumption of LCD types: 31W nom., 38W max..

Note on power consumption measurement: measured without printer.

SYSTEM POWER ON/OFF CONTROL

- One main power ON/OFF push switch hidden inside front door area for direct drive on PSU
- One ON (controlled ON/OFF) switch at right end of front edge of the system
- Position LP of the 6 position lock can be programmed as the software shutdown control according to POSIFLEX standard

OPERATOR DISPLAY

LCD (RS232 interface) – OD-300 for PST 1000

Display Type	monochrome STN – 2 * 20 LCD
View area	149 * 23 mm
Resolution	5*7 dot matrix
Character color	Dark blue
Back-light color	Yellow-green
View angle (V)	10° to 40° (for CR ≥ 2)
View angle (H)	-30° to 30° (for CR ≥ 2)
Swivel range	45°left, 30°right
Tilt angle	90°max
Power source	included in display connector

CRT display (VGA interface) – for PST 1010

Display Type	9” monochrome CRT	10” color CRT
Size	228 mm (9”) diag.	175 (6.9”) * 125 (4.9”) mm
Resolution	800 * 600 max.	1024 * 768 max.
Position movable range	Back & forth: 48mm (1.890”) max. Left to right: 30mm (1.181”) max.	
Swivel range	90°left, 90°right	
Tilt angle	20°max.	
Power source (UPS supported)	included in VGA display connector	AC input from output outlet of system power
Video memory	512 KB	

Note: For 10” color monitor, the AC power is used instead of the UPS supported DC power source in the VGA display connector. Hence, the 10”color monitor is not supported by the UPS function while the 9” mono monitor is supported.

UPS SUPPORT (battery not included)

- Supports system operation for 5~10 min. depending on loading condition of 24V printer and whether the UPS battery is fully charged
- STANDBY LED turned on when UPS stand-by at power on or AC power present during system off
- STANDBY LED flashes and system beeps when UPS starts working and discharging

PROGRAMMABLE KEYBOARD

- Spill-proof construction
- Extension keyboard wedge connector
- Transparent key caps over key tops
- 6 position key switch control, with key extractable at L0 and L1
- Security Key lock function locks up whole keyboard port
- 5 pages of programmable key definitions defined by 6 position key switch
- 112 sites max. of fully programmable keys for each page
- 255 bytes max. can be programmed for each key
- Total memory for keys to be programmed: 8 KB
- Programmable under DOS, Windows 3.1, or Windows95 without TSR or DLL program
- Multi-page programming
- Multi - level programming
- Time - delay programming
- Hot key programming (teach & learn)
- Answer back signal when position key changed or when enquired.
- Standard layout includes one quad key, two double keys, 12 numeric keys 00 0~9 and 92 single keys

INPUT / OUTPUT PORTS

- 1 X LAN port (Ethernet 10 base T)
- For PST 1010, 4 X serial communication ports with COM1 capable of supporting 5 V DC while each of the rest capable of supplying both DC +5V and DC +12V at 1A. Default setting is +5 V DC for COM1 and no DC output for all other ports.
- For PST 1000, only one serial port (COM2) can be used freely, (COM1 is used for both cashier and customer display and +5V DC output is default).
- 1 X parallel port
- One independent control for a dedicated cash drawer
- 1 X VGA display port with UPS supported DC supply for cashier display on PST 1010
- 1 X 24 VDC / 2 Amp. supply
- UPS connector for 2.3AH/12V Lead Acid battery or above

SSD MEMORY WITH HDD EMULATION

- 2MB standard
- Two memory sockets to support 2 memory modules
- Each memory module can be 2MB,4MB,8MB
- Max SSD memory up to 16MB

24VDC POWER SUPPLY TO POS PRINTER

- UPS supported
- 24 +/- 1.2 VDC at 2 AMP load
- Max. ripple + noise: 240 mV
- Accessory: cable CCBLA-146

PRELOAD DOS

LED COLOR

- POWER LED: green
- STANDBY INDICATOR: yellow
- MSR INDICATOR: dual color (green for good reading, red for invalid reading)

EXTERIOR

- DIMENSIONS:
  WIDTH: 408 mm (16.1”)
  DEPTH: 465 mm (18.0”)
  HEIGHT: 228 mm (9.0”) for LCD models (with OD300)
  379 mm (14.9”) for CRT models (with 9” mono)
- WEIGHT
  12.5Kg for CRT models
  8.0Kg for LCD models

ENVIRONMENTAL

- Temperature range:
  Operating: 0°C ~ +40°C
  Non-operating: -20°C ~ +70°C
- Humidity range:
  Operating: 20%RH ~ 80%RH, non-condensing max. wet bulb 26°C
  Non-operating: 10%RH ~ 80%RH, non-condensing max. wet bulb 28.9°C

ACCESSORIES

- USER'S MANUAL: 1 COPY
- ELECTRONIC KEY FOR PROGRAMMABLE KEYBOARD : 4 PCS (1 SET)
- MECHANICAL KEY FOR FRONT DOOR: 2 PCS
- PST LEGEND SHEET IN 4 COLORS
- CABLE FOR CASH DRAWER CONTROL (CCBLA-180 FOR CR-3100 / CR3200)
- DISKETTE FOR DRIVER UTILITY
- COM 1 TERMINATOR FOR PST 1010
- VFD TERMINATOR
- POWER CORD

OPTIONS

CUSTOMER DISPLAY

MODEL Number	PD101	PD201	PD2101	PD7000 series
Display Media	LED	LCD	VFD	LCD
Number of rows	1	2	2	2 or 4
Characters per row	8	16	20	10 or 20 or 26
Character width (mm)	12.5	4.8	7.2	8.35 or 17.95
Character height (mm)	14.2	8.0	11.25	8.35 or 17.95
Character in dot matrix format	7 segments	5 X 7	5 X 7	8 x 16, 16 x 16 or 6 x 8
Character color	Green	Dark blue	Green 505 nm	Dark blue
Horizontal slide (mm)	N.A.	N.A.	95	95
Horizontal rotation	360°	360°	360°	360°
Inclined viewing angle	60°/8	60°/8	14.5°and 30°	14.5°and 30°
Display area (mm x mm)	100.2 x 14.2	99 x 24	216 x 32	196 x 42.4

Remark : PD101 has 7 status indicator LED lamp

MAGNETIC STRIPE READER

Reader application

Applicable card type	ISO 7811	JIS X6302
Card feed method	Manual	Manual
Card feed direction	Bi-direction	Uni-direction
Card feed speed	5 ~ 55 IPS	100-1200mm/sec
Read / write function	Read only	Read only
Life of head	Approx. 300,000 passes	300,000 passes
Error rate	Less than 0.5%	Less than 0.1%
Available models	Tracks 1 & 2 or tracks 1, 2 & 3	JIS - II

Card data format

Card standard	IATA	ABA	THRIFT	JIS I	JIS - II
Track used	Track 1	Track 2	Track 3	Track 2	Rear side
Recording method	F^2F (FM)	F^2F (FM)	F^2F (FM)	F^2F (FM)	F^2F (FM)
Recording density	210 BPI	75 BPI	210 BPI	35 BPI	210 BPI
Recording capacity (characters / bits)	79 / 7	40 / 5	107 / 5	40 / 5	72 / 7

TWO EXTRA COM PORTS FOR PST1000

- COM3 & COM4 BOTH CAPABLE OF SUPPLYING +5 VDC AND +12 VDC POWER WHILE DEFAULTED TO GIVE NO DC OUTPUT
- THIS OPTION COMES WITH A VGA PORT AS WHAT IS FOR PST1010

KEY TOP OPTION

- QUAD KEY
- DOUBLE KEY
- SINGLE KEY
- BLANK KEY

UPS BATTERY

- 2.3 AH/12V Lead Acid battery

PRINTER: PP-3000

- DOT MATRIX 9 PIN
- HIGH SPEED BI-DIRECTIONAL
- FRICTION TYPE
- 40 COLUMNS FOR 15.4 CPI
- ACCEPTS PAPER WIDTH 2.25/3/3.25 INCHES WITH ADJUSTABLE PAPER GUIDE
- PRINTS ON ORDINARY OR UP TO 3-FOLD CARBONLESS COPY PAPER

INTERNAL MODEM CARD

- AFM100 – CUSTOMIZED SIZE TO FIT INTO THE SYSTEM

HDD

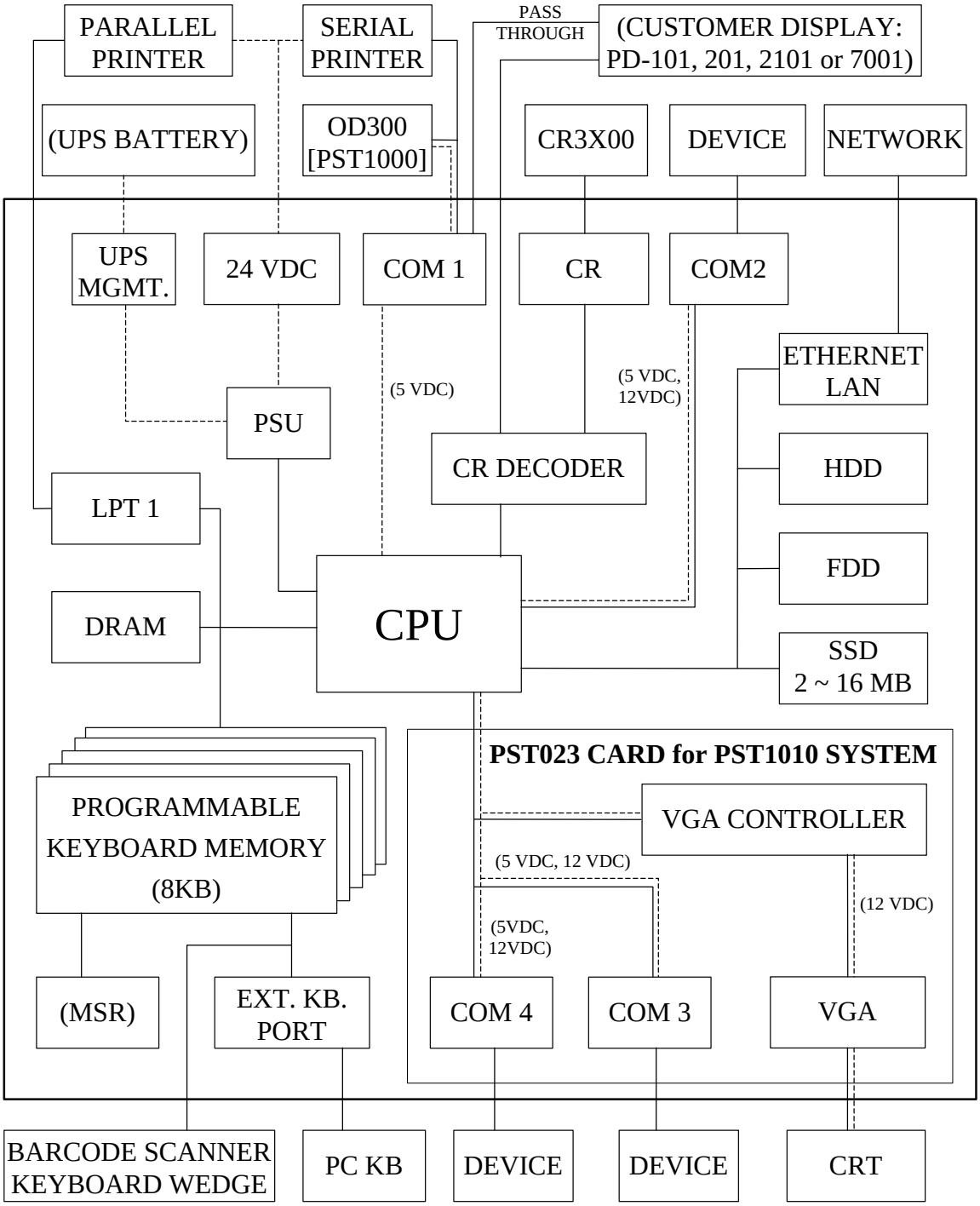
- 850MB AND ABOVE

RELIABILITY SPECIFICATION

- POWER SUPPLY MTBF: 50,000 HRS
- MONITOR MTBF: 30,000 HRS
- FDD MTBF: 30,000 HRS
- SSD MEMORY DATA HOLD TIME: 100 YRS
- VFD LIFE EXPECTANCY: 30,000 HRS
- LCD PANEL LIFE EXPECTANCY: 50,000 HRS
- LCD BACK LIGHT LIFE EXPECTANCY: 20,000 HRS
- MSR LIFE EXPECTANCY: 300,000 PASSES
- KEY SWITCH LIFE EXPECTANCY: 10,000,000 STROKES
- 6 POSITION KEY LIFE EXPECTANCY: 25,000 TIMES

SYSTEM DEFINITIONS

BLOCK DIAGRAM



EXTERNAL KEYBOARD CONNECTOR

PIN ASSIGNMENT OF 5 PIN DIN FEMALE CONNECTOR:

PIN #	DEFINITION
1	CLOCK
2	KEYBOARD DATA
3	NC
4	GROUND
5	+5 VDC

LAN PORT

PIN ASSIGNMENT OF 8 PIN TELEPHONE JACK:

PIN #	DEFINITION
1	TD +
2	TD -
3	RD +
4	NC
5	NC
6	RD -
7	NC
8	NC

- **This port is defined as 10 base T LAN port.**
- **IRQ 10 is applied for this port.**

CRT DISPLAY PORT CONNECTOR

- **This port is available in PST1010 or as option to PST1000**
- **DC +12 V is supplied to the monitor through specially designed different pins.**

★ **Short circuit will occur if any device other than the designated display is connected to the display port.**

★ **The DC supply in this connector is UPS supported.**

SERIAL PORT COM1

PIN ASSIGNMENT OF 9 PIN D SUB MALE CONNECTOR:

PIN #	DEFINITION	ALTERNATIVE	DEFAULT SETTING
1	DCD	+12 VDC	DCD
2	RX		
3	TX		
4	DTR		
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI	+5 VDC	+5 VDC

- **IRQ 4 is applied for this port.**
- **COM 1 terminator must be applied when there is no device connected to COM1 port, otherwise the CR port and customer display will not function.**
- **It is definitely inadvisable to connect serial input devices to COM 1 port without thorough investigation. The reason is that some input devices like serial mouse do not provide standard RS232 hardware handshaking signals. In PST systems, both the customer display and cash drawer controller share the COM 1 port. When the system issues any command to cash drawer controller or the customer display, the hardware handshaking signal will be in error status and could halt this port if COM1 is not connected properly.**
- **In PST1000, this connector is occupied by OD-300.**
- **DC supply of this port is UPS supported.**

SERIAL PORT COM2

PIN ASSIGNMENT OF 9 PIN D SUB MALE CONNECTOR:

PIN #	DEFINITION	ALTERNATIVE	DEFAULT SETTING
1	DCD	+12 VDC	DCD
2	RX		
3	TX		
4	DTR		
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI	+5 VDC	RI

- **IRQ 3 is applied for this port.**
- **This port is suggested when a modem is to be connected.**
- **DC supply of this port is UPS supported.**

SERIAL PORT COM3

PIN ASSIGNMENT OF 9 PIN D SUB MALE CONNECTOR:

PIN #	DEFINITION	ALTERNATIVE	DEFAULT SETTING
1	DCD	+12 VDC	DCD
2	RX		
3	TX		
4	DTR		
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI	+5 VDC	RI

- **This port is available in PST1010 or as option to PST1000**
- **IRQ applied: IRQ9**
- **DC supply of this port is UPS supported.**

Jumper selection: please refer to Chapter 4 of this manual about PST023.

SERIAL PORT COM4

PIN ASSIGNMENT OF 9 PIN D SUB MALE CONNECTOR:

PIN #	DEFINITION	ALTERNATIVE	DEFAULT SETTING
1	DCD	+12 VDC	DCD
2	RX		
3	TX		
4	DTR		
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI	+5 VDC	RI

- **This port is available in PST1010 or as option to PST1000**
- **IRQ applied: IRQ5**
- **DC supply of this port is UPS supported.**

Jumper selection: please refer to Chapter 4 of this manual about PST023.

CASH DRAWER CONTROLLER

- **The cash drawer solenoid input is a 200 msec. grounding signal.**
- **The power to cash drawer solenoid is DC 12 V nominal.**
- **The command to open cash drawers is decoded through COM 1.**
- **The drawer open indication can be detected by software through status check on RI signal of COM 1.**

PARALLEL PORT LPT1

PIN ASSIGNMENT OF 25 PIN D SUB FEMALE CONNECTOR:

PIN #	DEFINITION
1	- STROBE
2	D0
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	- ACK
11	BUSY
12	PE
13	SLCT
14	- AUTO FEED
15	- ERROR
16	- INIT
17	- SLCT IN
18	GND
19	GND
20	GND
21	GND
22	GND
23	GND
24	GND
25	GND

- **IRQ 7 is applied for this port.**

CUSTOMER DISPLAY CONNECTOR

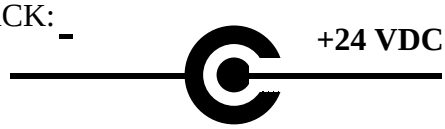
- **This port uses COM 1 of the system and data can be passed through to COM 1 connector when proper command is received.**
- **The VFD terminator must be applied when there is no customer display connected to this connector, otherwise the COM1 port and the CR controller will not function properly.**
- **DC supply to this device is UPS supported.**

24 VDC CONNECTOR

DC supply of this connector is UPS supported.

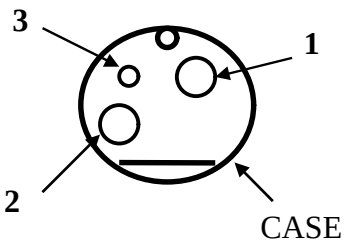
PIN ASSIGNMENT OF 3.5ϕ DC JACK:

PIN	DEFINITION
CENTER	+24 VDC
OUTER	**GND**



PIN ASSIGNMENT OF 3 PIN PLUG TO PRINTER:

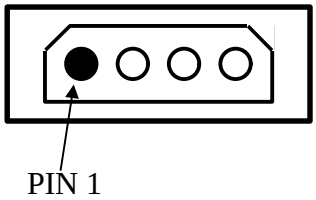
PIN	DEFINITION
1	+24 V
2	GND
3	N.C.
CASE	CHASSIS GND



UPS BATTERY CONNECTOR

PIN ASSIGNMENT OF 4 PIN SOCKET:

PIN	DEFINITION
1	+12 V
2	+12 V
3	GND
4	GND



APPLICATION GUIDES

OPERATOR DISPLAY

CRT MONITOR (FOR PST1010)

The CRT monitor used in PST1010 or as option to PST1000 (together with COM3 and COM4 whilst the monitor has to stand aside as the display platform is occupied by the OD300 in PST1000) can be considered as ordinary PC VGA monitor in application concern. However, the power to the 9" VGA monochrome monitor is supplied through the VGA connector and is UPS supported. Yet, when the monitor used is the 10" color monitor, the AC power is used and is not supported by the UPS function.

LCD DISPLAY (OD-300 FOR PST1000)

The operator display OD-300 is a slim-lined LCD display for 2 rows by 20 alphanumeric characters. This device when in use is connected to the COM1 connector which is pass through connected from the customer display port. So, this operator display can receive command / data from the host computer only when the customer display port is in pass through mode or is plugged with the "VFD terminator". Please refer to the appendix of this manual for the fonts used in OD300 and OD300JPN when the OD300 receives data to display. The commands applicable to OD300 are tabulated in the following pages. However, following command should be issued to the system first to set the communication protocol for this display to 9600 bps, none parity, 8 data bits and 1 stop bit:

MODE COM1 96,n,8,1 (enter)

It is very important for the software programmer to take special care in displaying the messages to the OD300, because there is no other display like a monitor to indicate the system response in a standard PST1000.

EPSON command mode (power on default)

COMMAND NAME	HEX CODES	FUNCTION
BS	<08>	Move Cursor Left
HT	<09>	Move Cursor Right
LF	<0A>	Move Cursor Down
HOM	<0B>	Move Cursor To Home Position
CLR	<0C>	Clear Display Screen
CR	<0D>	Move Cursor To Left Most Position
CAN	<18>	Clear Cursor Line
ESC =	<1B><3D><n>	Select Peripheral Device n=1 pass through (should not be used) n=2 OD-300 selected n=3 both OD-300/pass through selected n=4 switch to PST command mode
ESC @	<1B><40>	Initialize Display
US MD1	<1F><01>	Specify Overwrite Mode
US MD2	<1F><02>	Specify Vertical Scroll Mode
US MD3	<1F><03>	Specify Horizontal Scroll Mode
US LF	<1F><0A>	Move Cursor Up
US CR	<1F><0D>	Move Cursor To Right Most Position
US $	<1F><24><n><m>	Move Cursor To Specified Position n = 1 ~ 20 m = 1, 2
US @	<1F><40>	Show Version
US B	<1F><42>	Move Cursor To Bottom Position
US C	<1F><43><n>	Cursor On / Off n = 0, 1
US E	<1F><45><n>	Blink Display Screen n = 0 ~ 255

PST command mode

HEX CODE	FUNCTION
<01>	Set Pass Through Flag (should not be used)
<06> <N_1> <N_2>	Change Leading Code
<14> <01>	Wraparound Mode (Default)
<14> <02>	Vertical Scroll Mode
<14> <03>	Insert Mode
<14> <04>	Overwrite Mode (Default)
<14> <08>	Back Space
<14> <09>	Move Cursor Right
<14> <0A>	Move Cursor Down
<14> <0B>	Move Cursor Left
<14> <0C>	Delete Character
<14> <0D>	Move Cursor To Left Most Position
<14> <0E>	Clear Display
<14> <10>	Clear Line 1
<14> <11>	Clear Line 2
<14> <12>	Cursor Block Mode
<14> <13>	Cursor Under Line Mode
<14> <15> <02>	Clear Pass Through Flag
<14> <16>	Switch To Epson Mode
<14> <17>	Cursor On
<14> <18>	Cursor Off
<14> <19>	Reset
<14> <1A> <P>	Move Cursor To Position P (P=0~13,14~27h)
<14> <1B>	Move Cursor To Rightmost Position Of Line 1
<14> <1C>	Move Cursor To Rightmost Position Of Line 2

Though the power on default of the OD-300 itself is the Epson command mode, the PST system may have changed the mode to this PST command mode after the whole power-on-self-test depending on the software system installed. It would be advisable for the programmer to check ahead.

CUSTOMER DISPLAY

In the following sections, it is assumed that before any command / data given to the customer display, the PST system should have been previously prepared for issuing command to the customer display unit through the command given under DOS environment:

C:\> mode com1 96,n,8,1 (enter)

In other words, the protocols in RS-232C communication are listed below:

Baud Rate	9600 bps
Parity Check	none
Date Bits	8
Stop Bits	1

As for the data displayed, please refer to the appendix of this manual. The PD101 can only display numbers and decimal points in 7-segment form, and is therefor not exhibited. The charactors displayed in PD201 and its minor variation PD201JPN are shown in two separate pages. The fonts used in PD-2101 page 0, PD-2101 page 1, PD-2101 EPSON emulation page 0 and PD-2101 EPSON emulation page 1 describe PD2101. The fonts used in PD-7001 page 0, PD-7001 page 1 and international character sets describe PD7001.

The hardware handshaking signal of the customer display is defaulted to use CTS signal. For PST1000 series of system version B introduced in 2nd quarter of 1998 onward, this handshaking signal is selectable between CTS and DSR through change of jumper setting according to the description in hardware details.

PD-101 (LED DISPLAY)

The customer display PD-101 in PST1000 is internally connected through the cash drawer controller to the COM1 port of the host computer. The PD-101 enters pass through mode automatically when power on. The PD-101 monitors all data flowing from the COM1 port of the host computer for the clear pass through command (the leading codes of this command can be modified).

HEX CODES	FUNCTION								
<01>	Enter pass through mode								
<06><N_1><N_2>	Change leading code for clear pass through command								
<15><14><02>	Clear pass through mode								
<15><01><X>	LED Status: Light up LED according to value X.								
	X	30	31	32	33	34	35	36	37
	LED	All Off	S/TL	TTL	CASH	CHNG	DSCT	QNTY	U/P
<15><02><N_1> …<N_m><0D>	LED Data: <N_1> to <N_m> must be <2E> or <30> to <39>. 8 digits max.								

PD-201 (LCD DISPLAY)

EPSON command mode (power on default)

COMMAND NAME	HEX CODES	FUNCTION
BS	<08>	Move cursor left
HT	<09>	Move cursor right
LF	<0A>	Move cursor down
HOM	<0B>	Move cursor to home position
CLR	<0C>	Clear display screen
CR	<0D>	Move cursor to left-most position
CAN	<18>	Clear cursor line
ESC =	<1B><3D><n>	Select peripheral device n=1 COM1 (pass through) selected n=2 PD-201 selected n=3 Both COM1/PD-201 selected n=4 Switch to PST command mode
ESC @	<1B><40>	Initialize display
US MD1	<1F><01>	Specify overwrite mode
US MD2	<1F><02>	Specify vertical scroll mode
US MD3	<1F><03>	Specify horizontal scroll mode
US LF	<1F><0A>	Move cursor up
US CR	<1F><0D>	Move cursor to right-most position
US $	<1F><24><n><m>	Move cursor to specified position n = 1 ~ 16 m = 1 ~ 2
US @	<1F><40>	Show version
US B	<1F><42>	Move cursor to bottom position
US C	<1F><43><n>	Set/cancel cursor display n = 1, 2
US E	<1F><45>	Blink display screen n = 0 ~ 255

PST command mode

HEX COMMAND CODES	FUNCTION
<01>	Set Pass-Through Flag
<06><N_1><N_2>	Change Leading Codes
<14><01>	Wraparound Mode (Default)
<14><02>	Vertical Scroll Mode
<14><03>	Insert Mode
<14><04>	Overwrite Mode (Default)
<14><08>	Back Space
<14><09>	Cursor Right
<14><0A>	Change Row
<14><0B>	Cursor Left
<14><0C>	Delete
<14><0D>	Carriage Return
<14><0E>	Clear Display
<14><10>	Clear Line 1 Cursor Home
<14><11>	Clear Line 2 Cursor Head
<14><12>	Cursor Block
<14><13>	Cursor Underline
<14><16>	Switch to EPSON Mode
<14><17>	Cursor On
<14><18>	Cursor Off
<14><19>	Reset
<14><1A><P>	Move Cursor to position P
<14> <1B>	Move Cursor To Rightmost Position Of Line 1
<14> <1C>	Move Cursor To Rightmost Position Of Line 2
<21><23><02>	Clear Pass-Through Flag (no compensation transmission)

PD-2101 (VFD DISPLAY)

This customer display provides 4 emulation modes for software programming in controlling the display. The emulation mode is defined by adjusting the DIP SW on the back. See Fig. D-1.

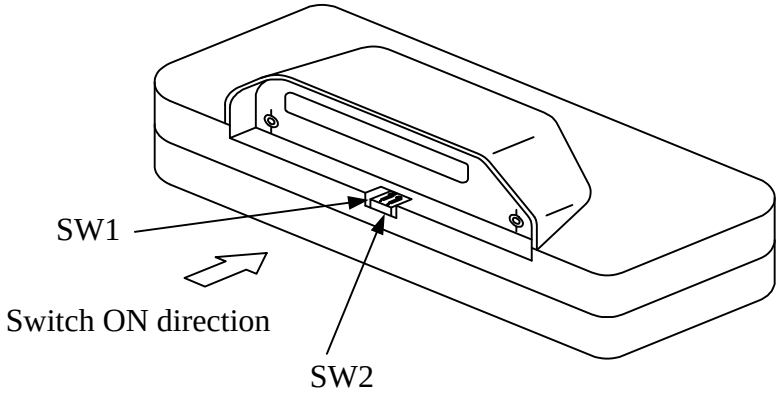
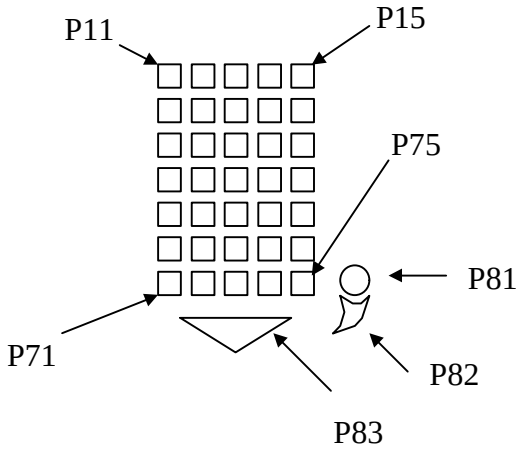


Fig. D - 1 DIP switch position

The relationship between the switch position and the emulation mode is summarized in the following table.

Emulation Mode	Futaba	Noritake	Aedex	Epson
SW 1	on	off	on	off
SW 2	on	on	off	off

On the VFD, there are totally at most 40 characters in 2 rows to be displayed at the same time, while each character displayed in the format of 5 by 7 rectangular dot matrix. To the lower right corner of each dot matrix there are a round shaped dot and a tail to form period and comma marks. For the characters in 2nd row of the VFD, there is one more feature to be displayed, which is the downward pointing triangle under each character. This triangular mark shall be referred to as the under mark for identification later on.



As illustrated in the above drawing, each rectangular dot in the font format shall be identified as P11, P12, …, P15, P21, P22, …, P25, P31, …, P35, …, P71, …, P75, P81, P82, P83. Where "Pn1" means the leftmost dot in the n^{th} row of the dot matrix and "Pn5" stands for the rightmost dot in the n^{th} row. P81 means the round dot to the lower right corner, P82 notifies the tail to form a comma and P83 denotes the under mark. These notations will be used in user defined fonts.

Futaba emulation mode

Command Name	**Hex Codes**	**Command Name**	**Hex Codes**
Reset	1F	Cursor on	13
Brightness control	04 bb	Cursor off	14
Change font page	1E 0p	(Horizontal tab.)	09
Moving sign	05 …… 0D	(Line feed)	0A
Change leading code	06 x1 x2	Horizontal tab	11 09
Set pass through flag	01	Vertical scroll up	12 09
Clear pass through flag	x1 x2 02	Cursor up/down	11 0A
Digit select	10 pp	Line feed	12 0A
Back space	08	Carriage return	0D

Noritake emulation mode

Command Name	Hex Codes	Command Name	Hex Codes
Reset	1B 49	Cursor on	15
Clear	0E	Cursor off	16
Moving sign	05 …… 0D	Back space	08
Change leading code	06 x1 x2	(Horizontal tab)	09
Set pass through flag	01	(Line feed)	0A
Clear pass through flag	x1 x2 02	Horizontal tab	11 09
Change font page	1E 0p	Vertical scroll up	12 09
Brightness control	1B 4C bb	Cursor up/down	11 0A
Digit select	1B 48 pp	Line feed	12 0A
Cursor blinking Rate	1B 54 nn	Form feed	0C
User defined graphics / fonts	1B 43 ad x1 ~ x5	Carriage return	0D

Aedex emulation mode

Attention code + Function code + Data + Carriage return

Function Code	Command Name	Function Area	Data Length
1	Display top	Top row	Max. 20 characters
2	Display bottom	Bottom row	Max. 20 characters
4	On going scroll	Top row	Max. 60 characters
6	One time scroll	Top row	Max. 60 characters
7	Stop trapping	N.A.	No characters
8	Change attention code	N.A.	2 characters
9	Display whole area	Both rows	Max. 40 characters

Epson emulation mode (power on default)

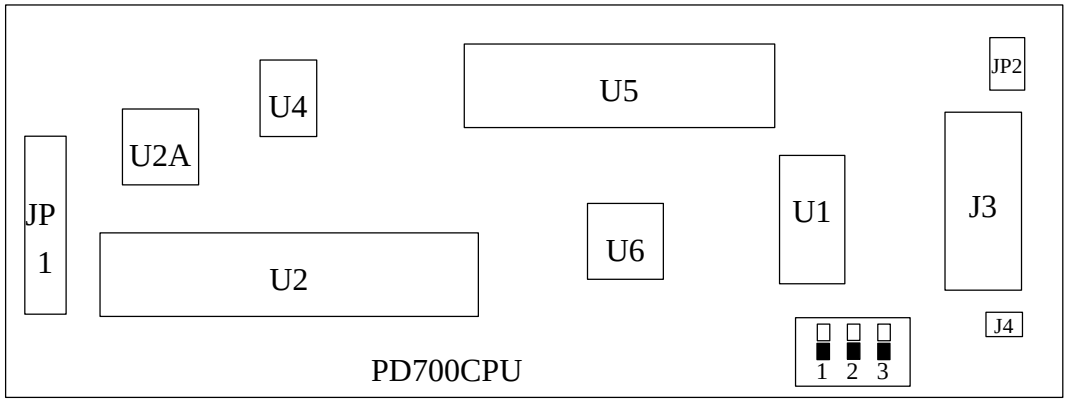
Command Name	Command & Hex Codes	Command Name	Command & Hex Codes
Move cursor left	**BS** 08	Clear display screen	**CLR** 0C
Move cursor right	**HT** 09	Clear cursor line	**CAN** 18
Move cursor down	**LF** 0A	Specify overwrite mode	**US MD1** 1F 01
Move cursor up	**US LF** 1F 0A	Specify vertical scroll mode	**US MD2** 1F 02
Move cursor home position	**HOM** 0B	Specify horizontal scroll mode	**US MD3** 1F 03
Move cursor to bottom position	**US B** 1F 42	Set/cancel display screen blinking	**US E** 1F 45
Move cursor to leftmost position	**CR** 0D	Brightness adjustment	**US X** 1F 58
Move cursor to rightmost position	**US CR** 1F 0D	Set & display counter (time)	**US T** 1F 54
Move cursor to specified position	**US $** 1F 24	Display counter (time)	**US U** 1F 55
Set/cancel user defined characters ★	**ESC %** 1B 25	Initialize display	**ESC @** 1B 40
Define user defined characters ★	**ESC &** 1B 26	Show firmware version	**US @** 1F 40
Delete user defined characters ★	**ESC ?** 1B 3F	Select peripheral device	**ESC =** 1B 3D
Select character code table	**ESC t** 1B 74		

The commands with ★ mark may not be 100% compatible with original EPSON commands.

PD-7001 (LCD DISPLAY)

NOTE : CARE SHOULD BE TAKEN NOT TO SEND ANY UNDEFINED CONTROL OR COMMAND CODES TO THE DISPLAY MODULE AS THIS MAY CAUSE A SOFTWARE MALFUNCTION OR EVEN SHUTDOWN OF THIS CUSTOMER DISPLAY.

JUMPER SETTINGS



SW1 & SW2 for power on default emulation mode

SW1 \ SW2	OFF	ON
OFF	EPSON 2 X 20	NORITAKE 2 X 20
ON	EPSON 4 X 26	N.A.

	OFF	ON
SW3	NO LOGO AT POWER-ON	SHOW LOGO AT POWER-ON
J4	N.A.	Default

EPSON MODE -- 2 LINES X 20 CHARACTERS

Command	Name	Code
BS	Move cursor left	<08>h
HT	Move cursor right	<09>h
LF	Move cursor down	<0A>h
HOM	+ Move cursor to home position	<0B>h
CLR	+ Clear display screen	<0C>h
CR	Move cursor to left-most position	<0D>h
CAN	Clear cursor line	<18>h
ESC %	Set/cancel user-defined character set	<1B>h <25>h <n> n = 1 : set n = 0 : cancel
ESC &	Define user-defined character (* Max. 3 characters * multiple definition in 1 command * every time new define command will overlay old definition from the first character) (ref. 4.4 for x1 to x16)	<1B>h <26>h <s> <n> <m> [<a> <x1> <x2> … … <x16>]m-n+1 where: s = 2 , a = 8, n = starting address, m = ending address
ESC =	Select peripheral device: n = 1 -> pass through selected + n = 2 -> display selected n = 3 -> pass through / display both selected Reset display mode: n = 10-> Epson 2x20 mode n = 20-> Noritake 2x20 mode n = 40-> Epson 4x26 mode n = 80-> (must not be used)	<1B>h <3D>h <n>h
ESC ?	Delete user-defined character	<1B>h <3F>h <n>
ESC @	Initial display	<1B>h <40>h

EPSON MODE -- 2 LINES X 20 CHARACTERS (CONTINUED)

Command	Name	Code
ESC C	Select cursor	<1B>h <43>h <n> n = 0 : cursor invisible + n = 1 : cursor visible
ESC R	Select international character set	<1B>h <52>h
ESC t	Select character code table	<1B>h <74>h <n> + n = 0 : page 0 selected n = 1 : page 1 selected
US MD1	+ Specify overwrite mode	<1F>h <01>h
US MD2	Specify vertical scroll mode	<1F>h <02>h
US MD3	Specify horizontal scroll mode	<1F>h <03>h
US LF	Move cursor up	<1F>h <0A>h
US CR	Move cursor to the right-most position	<1F>h <0D>h
US $	Move cursor to the specified position	<1F>h <24>h <n> <m> <n>th column <m>th line
US :	Set start/ending position of macro definition max. 60 byte commands (Macro definition and user - defined characters can not exist at the same time)	<1F>h <3A>h
US @	Execute self-test (* show version, * show overwrite, vertical/ horizontal scroll modes, * show all characters of current code table)	<1F>h <40>h
US B	Move cursor to bottom position	<1F>h <42>h
US E	Blink display screen	<1F>h <45>h <n> n x 50 ms = on/off time n = 0, display keep on n = 255, display keep off
US ^	Execute macro	<1F>h <5E>h <n> <m> n x 20 ms = interval of bytes m x 50 ms = interval of macros

+ Display automatically default to these conditions after power-on or reset

NORITAKE MODE -- 2 LINES X 20 CHARACTERS

COMMAND	DESCRIPTION (limitations)
<08>	Back Space: This command moves the cursor to the left digit. If the current position is the most significant digit (MSD) of the 2nd row, the cursor will move to the least significant digit (LSD) of first row. If the current position is the MSD of the first row, the cursor will not move.
<11> <09>	Horizontal Tab: This command moves the cursor one digit to the right. If the current position is the LSD of the 1st row, the cursor will move to the MSD of the 2nd row. If the current position is the LSD of the 2nd row, the cursor will move to MSD the 1st row.
<12> <09>	Vertical Scroll Up: After writing as character to the LSD of the 2nd row, all 2nd characters are transferred to the 1st row, leaving a blank line on the 2nd row. The new cursor position is at the MSD of the 2nd row. If the cursor is not at LSD of the 2nd row, this command only moves the cursor to the next digit on the right.
<11> <0A>	Cursor Up/Down: Cursor moves up or down to another row.
<12> <0A>	Line Feed: If the cursor is at the 2nd row, all characters in the 2nd row will be transferred to the 1st row, and leave a blank 2nd row. The cursor position is unchanged. If the cursor is at the 1st row, it simply moves directly down to the 2nd row. Characters are not effected.

NORITAKE MODE -- 2 LINES X 20 CHARACTERS (CONTINUED 1)

COMMAND	DESCRIPTION (limitations)
<0D>	Carriage Return: Cursor moves to the current row's MSD position.
<0C>	Form Feed: Cursor moves to the MSD of the 1st row.
<1B> <48> <P>	Digit Select: Move cursor to position P, where P is the digit position in hex number. For example. P=00 1st row MSD P=01 1st row 2nd digit P=13 1st row LSD P=14 2nd row MSD P=27 2nd row LSD
<15>	Cursor On: Cursor On or lighted.
<16>	Cursor Off: Cursor off.
<1B> <49>	Reset: All characters erased and all settings returned to power-on reset conditions.
<0E>	Clear: All displayed characters are cleared. Cursor stays at the same position.
<05>	Moving Sign Enables a scrolling message to be sent to the display. The string characters can be up to 45 characters long and terminated by <0D>. The message will scroll on the first row. It is disabled automatically when other information is sent.

NORITAKE MODE -- 2 LINES X 20 CHARACTERS (CONTINUED 2)

COMMAND	DESCRIPTION (limitations)
<1E><P>	Change font page + P = 0: page 0 selected P = 1: page 1 selected
<01>	Set Pass-through Flag Serial Pass-through and Parallel Pass-through pole displays only. Enables the pass- function. All data following the setting of this flag will pass-through the pole display and go to another peripheral device.
<21> <23> <02>	Clear Pass-through flag Serial Pass-through and Parallel Pass-through pole displays only. Disables or clears the pass-through function. (Two leading codes are programmable)
<06>	Change leading code The two leading code followed the command will replace the default leading code <21> and <23>.
<1B> <43> <Addr> <x1> <x2> … <x16>	User Defined Graphics/Fonts: <Addr> specifies the address where the user defined graphics/font to be stored. <x1>.....<x16> are the 16 bytes defining the dots of the 8 x 16 matrix to be turned on in the user defined character (ref. 4.4). Recommended <Addr>= A0 through FF, and no more than 3 user defined graphics/fonts.
<1B> <3D> <n>	Reset display mode n = 10-> Epson 2 x 20 mode n = 20-> Noritake 2 x 20 mode n = 40-> Epson 4 x 26 mode n = 80-> (must not be used)

EPSON MODE -- 4 LINES X 26 CHARACTERS

Command	Name	Code
BS	Move cursor left	<08>h
HT	Move cursor right	<09>h
LF	Move cursor down	<0A>h
HOM	+ Move cursor to home position	<0B>h
CLR	+ Clear display screen	<0C>h
CR	Move cursor to left-most position	<0D>h
CAN	Clear cursor line	<18>h
ESC %	Set/cancel user-defined character set	<1B>h <25>h <n> n = 1 : set n = 0 : cancel
ESC &	Define user-defined character (* Max. 3 characters * multiple characters can be defined in 1 command sets * every time new define command execution will overwrite the old definition from the first character)	<1B>h <26>h <s> <n> <m> [<a> <x1> <x2> … … <x8>]m-n+1 s = 1 , a = 5, n = starting character, m = ending character (ref. 4.4 for x1 to x8)
ESC =	Select peripheral device n = 1 -> pass through selected + n = 2 -> display selected n = 3 -> pass through/display both selected Reset display mode n = 10-> Epson 2x20 mode n = 20-> Noritake 2x20 mode n = 40-> Epson 4x26 mode n = 80-> (must not be used)	<1B>h <3D>h <n>h
ESC ?	Delete user-defined character	<1B>h <3F>h <n>h
ESC @	Initial display	<1B>h <40>h

EPSON MODE -- 4 LINES X 26 CHARACTERS (CONTINUED)

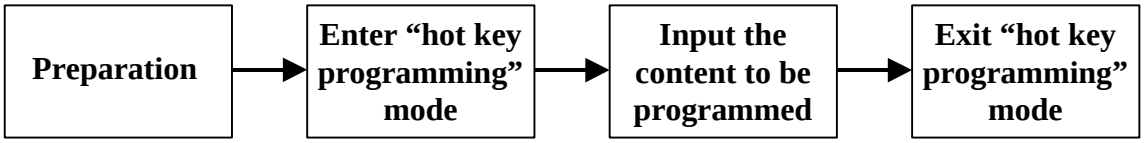
Command	Name	Code
ESC C	Select cursor	<1B>h <43>h <n> n = 0 : cursor invisible + n = 1 : cursor visible
ESC R	Select international character set	<1B>h <52>h
ESC t	Select character code table	<1B>h <74>h <n>h + n = 0 : page 0 selected n = 1 : page 1 selected
US MD1	+ Specify overwrite mode	<1F>h <01>h
US MD2	Specify vertical scroll mode	<1F>h <02>h
US MD3	Specify horizontal scroll mode	<1F>h <03>h
US LF	Move cursor up	<1F>h <0A>h
US CR	Move cursor to the right-most position	<1F>h <0D>h
US $	Move cursor to the specified position	<1F>h <24>h <n> <m> where: <n>th column <m>th line
US @	Execute self-test (* show version * show overwrite, vertical/ horizontal scroll modes * show all characters of current code table)	<1F>h <40>h
US B	Move cursor to bottom position	<1F>h <42>h
US E	Blink display screen	<1F>h <45>h <n> n x 50 ms = on/off time n = 0, display keep on n = 255, display keep off

+ Display automatically default to these conditions after power-on or reset

PROGRAMMABLE KEYBOARD

HOT KEY PROGRAMMING

The POSIFLEX programmable keyboard supports the “Hot key programming” method which is most useful in instant modification of a few keys in a preprogrammed keyboard without entering the more sophisticated programming utility. Of course, the user may also use this feature to program through out all 112 keys by 5 pages (LP and L1 to L4) at will. The whole process of “Hot key programming” contains 4 steps for each key to be programmed and is illustrated as following:



PREPARATION

Please connect a standard PC or PS-2 keyboard to the external keyboard port and settle the software and the rest hardware exactly the way application program requires before entering “Hot key programming” mode. The user shall then decide which key of which page is to be programmed and turn the 6 position control key to the proper position before entering the “Hot key programming” mode. Please note that the answer back codes of the position control key is not covered by the “Hot key programming” feature.

ENTER “HOT KEY PROGRAMMING” MODE

To enter the “Hot key programming” mode, the user must input the “Hot key” and identify the key on the programmable keyboard to be programmed. The so called “Hot key” is a special combination of keys pressed on the standard PC or PS-2 keyboard. In PST programmable keyboard, the “Hot key” is defined as pressing and holding the **left** “Alt” key while pressing the “PRT SC” (“Print Screen”) key on the PC or PS-2 keyboard. And by doing so, the programmable keyboard will give 2 beeps to notify that it is ready to receive the identification of which key to be programmed.

Right after the “Hot key” is released, the user shall press the key to be programmed on the programmable keyboard once to identify which key to be programmed. If the “Hot key” is pressed for the second time or the “Esc” key is pressed prior to the press of the key on the programmable keyboard, this mode will be aborted immediately. The user should not enter the “Hot key programming” mode when the programmable keyboard is already fully loaded (no more free memory for further programming) by the key contents previously programmed.

INPUT THE CONTENT TO BE PROGRAMMED

Once the programmable keyboard enters the “Hot key programming” mode with the key to be programmed identified, what the user types on the standard PC or PS-2 keyboard will be taken for the content to be programmed into that key of the programmable keyboard till the user exits the “Hot key programming” mode.

The legal input in this mode includes all alphabetical letters (including both upper and lower cases), numerical digits (applicable only for keys at the area above the alphabetical keys and excluding those on the numerical keypad), symbols (such as `!”#$ and those keys excluding arithmetic signs in the numerical keypad) and the “Enter” key. The “Shift” key, the “Caps lock” key and the “Back space” key are also accepted in this mode to serve an editing purpose (for example, pressing “Back space” will erase the last character of the input instead of being treated as a character for input). Pressing the “Esc” key in this mode will abort the “Hot key programming” mode immediately. All the rest keys (such as the “Ctrl”, “Alt”, “Home”, any function key or arrow key or any key in the numerical keypad) on the standard PC or PS-2 keyboard are illegal inputs in this mode. The maximum number of key presses acceptable to any key by “Hot key programming” is 32.

All the input from the standard PC or PS-2 keyboard in this mode will also be sent to the host computer.

EXIT “HOT KEY PROGRAMMING” MODE

After the intended content of the key is completely entered, the user shall press the “Hot key” again to notify the end of “Hot key programming”. The programmable keyboard will give one beep to signify the normal exit of the “Hot key programming” mode. Should there be any illegal entry in the content of the key or any other improper

operation during the programming, the programmable keyboard will give three beeps to signify the failure of “Hot key programming” and the key content is not changed. If the user pressed the “Esc” key to abort “Hot key programming”, the programmable keyboard will also give three beeps immediately as a response to signify the abort.

COMMON PROGRAMMING (KBM.EXE)

COMMAND LISTING IN VIEW MODE

ESC -- quit the keyboard programming program
F1 -- get help on command list
F3 -- enter the configuration screen
F5 -- enter ASCII-code editing mode
F8 -- enter scan-code editing mode
F10 -- quit the keyboard programming program
Ins -- toggle insert/overwrite status for editing (default = insert)
Del -- delete the content of the key where cursor stays
Home -- go to column A of same page same row
End -- go to column I of same page same row
PgUp -- go to one page less in cyclic manner
PgDn -- go to one page next in cyclic manner
Up arrow -- move cursor to one row up in cyclic manner
Down arrow -- move cursor to one row down in cyclic manner
Left arrow -- move cursor to one column left in cyclic manner
Right arrow -- move cursor to one column right in cyclic manner
ENTER -- enter ASCII-code editing mode, but if the last edit of the key was in scan-code mode then this means enter scan-code editing mode.
Alt-A -- enter ASCII-code editing mode
Alt-C -- copy the key content of a key or contents of the keys in a page to buffer
Alt-E – erase the current page or all pages
Alt-G -- enter the configuration page
Alt-L -- load key definitions from a disk file
Alt-M -- enter multi-level shift marker
Alt-N -- enter scan-code editing mode

Alt-O -- load key definitions from a disk file
Alt-P -- paste the buffer content to key definition
Alt-R -- read key definitions from the programmable keyboard
Alt-S -- save key definitions to a disk file
Alt-T – toggle key-content format between page-wise and column-wise
Alt-U -- recover key definition before last change
Alt-W -- write key definitions to the programmable keyboard
Alt-X -- quit the keyboard programming program
any other key stoke -- will be taken as an input in ASCII-code editing mode, and will give no influence if the current key was last edited in scan-code editing mode

COMMAND LISTING IN ASCII-CODE EDITING MODE

ESC -- enter view mode
F1 -- get help on command list of ASCII- code editing mode
F5 -- enter view mode
F8 -- enter view mode
F10 -- enter view mode
BkSp -- delete the character to the left of cursor
Ins -- toggle insert/overwrite status for editing (default = insert)
Del -- delete the character where cursor stays or the last character
Home -- go to first position within the key definition
End -- go to last position within the key definition
PgUp -- go to one page less in cyclic manner
PgDn -- go to one page next in cyclic manner
Up arrow -- move cursor to one row up in cyclic manner and enter view mode
Down arrow -- move cursor to one row down in cyclic manner and enter view mode
Left arrow -- move cursor to one character left within the key definition
Right arrow -- move cursor to one character right within the key definition
Alt-A -- enter view mode
Alt-C -- enter a “Caps Lock” into the key-content
Alt-D -- enter time delay mark into the key-content
Alt-N -- enter view mode

Alt-S -- enter a multi-level separator between definitions of different levels.
Alt-X -- enter view mode
Alt-27 -- enter an "ESC" into the key-content
Alt-8 -- enter a "BkSp" into the key-content
Ctrl-C -- immediately terminates the programming utility.
any other key stoke -- will be taken as input in ASCII-code editing mode.

COMMAND LISTING IN SCAN-CODE EDITING MODE

ESC -- leading code to enter scan code of any key after it into key-content, except "ESC" + "F" for utility version since 2.15.xx
ESC-F -- leading code of arbitrary release code for utility version since 2.15.xx. Usually used to release "CTL", "ALT" or "SHF".
F1 -- get help on command list of ASCII- code editing mode
F5 -- enter view mode
F8 -- enter view mode
F10 -- enter view mode
BkSp -- delete the character to the left of cursor
Ins -- toggle insert/overwrite status for editing (default = insert)
Del -- delete the character where cursor stays or the last character
Home -- go to first position within the key definition
End -- go to last position within the key definition
PgUp -- go to one page less in cyclic manner
PgDn -- go to one page next in cyclic manner
Up arrow -- move cursor to one row up in cyclic manner and enter view mode
Down arrow -- move cursor to one row down in cyclic manner and enter view mode
Left arrow -- move cursor to one character left within the key definition
Right arrow -- move cursor to one character right within the key definition
Alt-A -- enter view mode
Alt-D -- enter time delay mark into the key-content
Alt-M -- enter a multi-level shift marker into the key-content
Alt-N -- enter view mode
Alt-S -- enter a multi-level separator between definitions of different levels.
Alt-X -- enter view mode

Alt-27 -- work like “ESC” as the leading code for scan codes.
Alt-8 -- enter a “BkSp” into the key-content
Ctrl-C -- immediately terminates the programming utility.
any other displayable key stoke -- will be taken as input in scan-code format.
any other non-displayable key stroke -- will have no influence

ANSWER BACK CODE

Programming the answer back codes of the 6 position electronic key-lock is also very easy as they are included in the keyboard programming with the locations coded as “KLP”, “KL0”, “KL1”, “KL2”, “KL3” and “KL4” in the key-layout map of page L1. These answer back codes will be issued by the programmable keyboard to PC whenever the 6 position electronic key is switched to a new position (there will be a time delay as determined in the configuration of the keyboard programming utility and is adjustable by “r” and “t” key presses, this time delay is useful to give only the answer back code of the last position of control key when it is turned across multiple positions) or when the keyboard receives an “Enquiry” code (E7h) from the PC or the PST system. Here are some examples of sending this “Enquiry” code to the programmable keyboard in different languages:

Language	**Syntax**
C	outp (0x60, 0xE7)
BASIC	out &H60, &H0E7
DEBUG	o 60 E7

SHORTCUT UTILITY (RWM.EXE)

The feature of this RWM.EXE is designed mainly for the off-line programming purpose and is very useful in quick reproduction of the preprogrammed contents of the programmable keyboard. In such application, the user should have either the preprogrammed keyboard or the preprogrammed file with “.tpl” extension name that is the result of the keyboard programming. The user may use RWM.EXE to directly transfer the programmed result of the programmable keyboard to a “.tpl” file or directly transfer a prestored “.tpl” file to a programmable keyboard without entering the utility “KBM.EXE” which may take more keystrokes. For instance, the user wants

to transfer a file “XXX.tpl”, which was saved before, to the programmable keyboard, he/she should type in following command in subdirectory “POSIFLEX.D”:

RWM XXX.tpl (enter)

This operation is quite recommended to be performed on a daily basis to ensure the system stability.

On the other hand, when the user wants to save the contents of a programmed keyboard, e.g. when he/she newly receives a programmable keyboard, to a file named “YYY.tpl”, he/she should type in following command in subdirectory “POSIFLEX.D”:

RWM -r YYY.tpl (enter)

HARDWARE LIMITATION

In the programmable keyboard, the detection of each key press is achieved through the use of combination of “Logical columns” and “Logical rows”. For any key pressed, the “Logical column” of that key is connected to the “Logical row” of the same key by hardware, the CPU of the programmable keyboard detects such connection and determines that which key has been pressed. However, in the case of multiple simultaneous key-press, there are limitations on the position of the keys selected. The basic rule of such limitations is:

No two keys in the combination are allowed to be in the same “Logical row”.

The reason is that when any two keys of the same “Logical row” are pressed in the same time, then there will be two “Logical columns” connected together through that involved “Logical row”, causing some difficulties by its nature in identifying which key is pressed. To overcome such problem, the output of the programmable keyboard when the above rule is violated could be prohibited.

SSD MEMORY

Considering the fact that the life of the SSD is limited and the speed of SSD is inferior to DRAM just like a HDD is, the software programmer of PST1000 series is hereby recommended to use some utility like RAMDRIVE. The software shall then copy the data file from SSD to RAMDRIVE at the beginning of the program and modify the data in RAMDRIVE according to the proceedings of the transaction. The software shall then copy the data file in RAMDRIVE back to SSD only after a transaction is completed and the system is waiting for the printer for a receipt or, if the PST1000 system is equipped with the UPS battery, copy the data back to SSD once every certain number of transactions or after certain period of time and when the program is to be terminated. Through such application the system performance and endurance will be better secured even in a very busy point of sale.

When the user installs more SSD than the original equipped, it is very important to make the backup copy of the vital data before any attempt to initialize the new SSD into effect because the initialization process will erase all information in SSD out including the software itself. If there are two SSD units to be installed, unlike the first SSD, the JP1 of the second SSD unit must be disconnected while the JP3 remains shorted for either module. Of course, all components involved in SSD initialization operation must be well prepared. That means that the PST1000 system itself and the SSD module(s) to be initialized for new SSD configuration must not be improperly turned off before this initialization. If any of the above components was turned off improperly either by the internal hardware ON/OFF switch or AC power failure right before the SSD initialization, the initialization process could be ruined.

The initialization process is very simple. After proper backup and preparation for reloading the software is done, the user has only to put the diskette marked as “SSD initialization” into the floppy drive and restart the power on procedure. After a while, the system may be re-initiated several times, when the system turns its own power off, the SSD initialization is completed. The whole process is automatic. So, insertion of this “SSD initialization” diskette must be handled with **absolute care**.

POWER ON/OFF CONTROL

EXTERNAL POWER SWITCH

This switch is originally a software controlled power "ON/OFF" switch. It can be programmed into a power "ON" only switch through software command. The so called software controlled switch means that when the switch is pressed during system working, the system will be turned off after all data in the SSD buffer are secured. The SSD buffer mentioned here is an infrastructure of the system and is different from the RAMDRIVE mentioned in the last section. To program this switch, the programmer needs to issue the following mentioned commands in the application program to COM1 under the protocol: 9600 bps, parity none, 8 data bits, 1 stop bit.

- **Change to power on only switch** -- the command string is <1B> <19> <01> in hexadecimal format.
- **Change to power on/off switch** -- the command string is <1B> <19> <00> in hexadecimal format (default status)

SOFTWARE SWITCH OFF

An even safer method to turn the system off is the software off switch. Usually the position LP of the 6 position key switch (or any other key or key combination or any other position of the 6 position key switch as may be preferred) is selected for this purpose. The programmer has to program the answer back code of position LP of the programmable keyboard to some command to close the application program (such as "Alt+F4"). At the end of the closing operation, the application program should issue the following mentioned software switch off command string to COM1 under the protocol: 9600 bps, parity none, 8 data bits, 1 stop bit. Or, as an alternative, the programmer may program the answer back code of position LP to contain:

The closing command of the application program;
A certain period of hold on time to allow a safe closing;
The command to call for a program which will send the software switch off command string to COM1 as described.

The hexadecimal command string for software switch off function is : <1B> <06> <16> <19> <0D>.

In other words, the two approaches to utilize the software switch off function are:

The recommended:

Keyboard gives closing command of Application Program

Application Program closes itself and gives switch off command

System secures all data and turns power off

The Alternative:

Keyboard gives closing command of Application Program and …

Application Program closes itself

Keyboard gives switch off command at a predefined time

System secures all data and turns power off

CASH DRAWER

The software command to open the cash drawer is a hexadecimal code of <07> sent to COM1 port under the protocol of 9600bps, none parity, 8 data bits, 1 stop bit.

The drawer open status can be obtained through checking the communication status of COM1 at signal RI. When there is no drawer open, the RI signal of COM1 is always set. When there is any cash drawer opened, the RI signal of COM1 is reset. The RI signal is obtained as the bit 6 (the second most significant bit) of the I/O address 3Feh if the COM1 address is set to 3F8h~3FFh (conventional address for COM1) in system configuration.

UPS BATTERY

The optional UPS battery is a maintenance-free lead-acid battery and is targeted to support basically the data preservation and smooth running of the system during intermittent power failure. This battery is not designed for prolonged power support to the system against power shutdown. That means, when the AC power outage is known to last for more than few minutes, it is advisable to turn off the system instead of using the battery up while repeatedly using it up reduces the battery life dramatically.

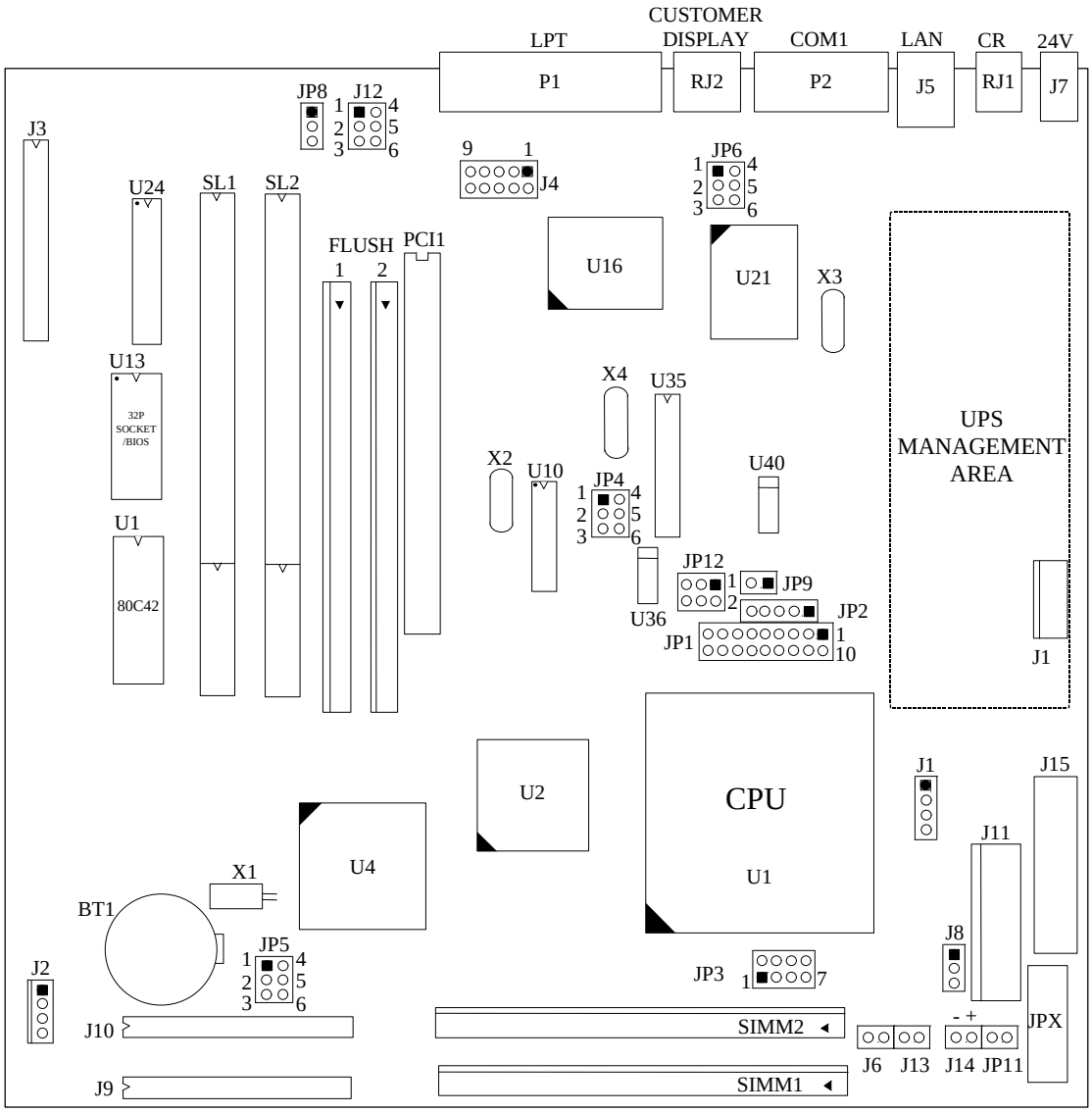
The battery will undergo self-discharging over time even when not in use. An useful advice to preserve the battery at best condition is to regularly recharge the battery if the battery or the PST system with the battery is put in storage for a period

of time. It is recommended to turn on the system to recharge the battery for 1 ~ 2 hours every 3 months of storage if the storage temperature is lower than 30°C. The battery should be recharged for 1 ~ 2 hours every month if the storage temperature exceeds 30°C. However, the user shall avoid the situation with storage temperature over 30°C to protect the life of the battery. Do not connect any other battery to this UPS battery because mixed use of batteries of different capacity, history, or manufacturers may cause damages. In case the user wants to have a longer battery support time during AC power off, he/she should consult his/her dealer for application of an external 12 V battery.

HARDWARE DETAILS

MAIN BOARD (PST888)

PCB LAYOUT



CONNECTORS

Position	Port Name	Usage
J1	SPKR	Connect to speaker
J2	KB	Connect to programmable keyboard
J3	FDD	Connect to floppy drive
J4	COM2	Connect to COM2 through cable (pin 10 open)
J5	LAN	To be connected to twisted pair in RJ45
J7	24 VDC	To supply power to printer in 5.5/2.5 plug
J8	STAND BY	Connect to stand by control of SPS
J9	IDE (Pri.)	Reserved primary IDE
J10	IDE (Sec.)	Reserved secondary IDE
J11	PS	Main power supply from AT SPS
J12	COM2 DC	Select for DC supply to COM2
J14	STND LED	Connect to stand by indicator
J15	PS	Main power supply from ATX SPS
J16	UPS BATT.	Connect to UPS battery
JP1	CPU SEL.	Select CPU models
JP2	CPU SEL-2	Select CPU models
JP3	CPU VOLT	Select CPU voltage between 3.3V and 5V
JP4	CLCK SEL.	Select on board clock
JP5	RTC	Select RTC to normal operation or reset
JP6	VFD HS	Select CTS or DSR for hand shaking of VFD
JP8	COM1 DC	Select for DC supply to COM1
JP9	AMD DX2	Select only for AMD DX2-80
JP11	PWR SW	Connect to the internal power ON/OFF switch
JP12	CPU SEL-3	Select CPU models
JPX	ON SW	External power on switch

CONNECTORS (continued)

Position	Port Name	Usage
P1	LPT1	Parallel port
P2	COM1	Serial port
RJ1	CR	To be connected to CR-3xxx
RJ2	CUST DISP	To be connected to customer display
FLUSH1	SSD	To insert SSD memory for HDD emulation
FLUSH2	SSD	To insert SSD memory for HDD emulation
SIMM1	DRAM	To insert DRAM for system memory
SIMM2	DRAM	To insert DRAM for system memory
PCI1	PCI SLOT	To insert half length PCI card for expansion
SL1	ISA SLOT	To insert half length ISA card for expansion
SL2	ISA SLOT	To insert half length ISA card for expansion
U1	CPU	To insert CPU with cooling fan

JUMPER SETTINGS ("★" marks the default setting)

CPU select

CPU models	Jumper settings
AMD 486DX2-80NV8T	JP1-3~JP2-2, JP1-6~JP2-5, JP9 short
AMD 486DX4-100NV8T	JP1-3~JP2-2 short
AMD 486DX4-100SV8B	JP1: 1-10, 2-11, 3-12, 4-13, 5-14, 6-15 short, JP12: 1-2, 3-4 short
AMD 5K86	JP1: 2-11, 3-12, 4-13, 5-14, 6-15 short, JP12: 1-2, 3-4 short
AMD 5K86-133	JP1: 1-10, 2-11, 3-12, 4-13, 5-14, 6-15, 9-18 short, JP12: 1-2, 3-4 short
CYRIX 5X86	JP1: 2-11, 4-13, 5-14, 6-15 short, JP12: 1-2, 3-4 short
CYRIX 5X86-100GP	JP1: 2-11, 4-13, 5-14, 6-15 short, JP1-3~JP2-2 short, JP12: 1-2, 3-4 short
CYRIX 5X86-133	JP1: 2-11, 4-13, 5-14, 6-15, 9-18 short, JP1-3~JP2-2 short, JP12: 1-2, 3-4 short
INTEL 486DX4	JP1: 4-13, 5-14, 6-15, 8-17 short, JP1-3~JP2-2 short
TI 486DX2/DX4	JP1-2~JP2-1, JP1-3~JP2-2, JP1-4~JP2-3, JP1-5~JP2-4, JP1-6~JP2-5 short, JP12: 5-6 short
ST 486DX4-100 (3.3V)	JP1: 2-11, 4-13, 5-14, 6-15 short, JP1-3~JP2-2 short, JP12: 1-2 short

CPU voltage select

CPU voltage	JP3 settings
3.3 V	5-6, 7-8 short
5 V	1-2, 3-4 short

CLOCK select

CLOCK rate	25 MHz	33.3 MHz	40 MHz	50 MHz
JP4 settings	1-4 short	1-4, 2-5, 3-6 short	1-4, 2-5 short	3-6 short
Applicable CPU types	DX2-50 DX4-75	DX2-66 DX4-100 5X86-133	DX2-80 DX4-120 5X86-160	DX-50 DX4-150

RTC select

Function	JP5 settings
Normal operation	1-2, 4-5 short ★
Reset RTC	2-3, 5-6 short

Customer display hardware handshake select

Handshaking through	JP6 settings
CTS of COM1	1-2, 4-5, 3-6 short ★
DSR of COM1	2-3, 5-6, 1-4 short

This jumper is introduced on the main board bearing version number as PST888G for system version B in 2nd quarter of year 1998. The hardware handshaking signal for the customer display should be selected according to the application program used. The default is to use CTS.

COM1 DC select

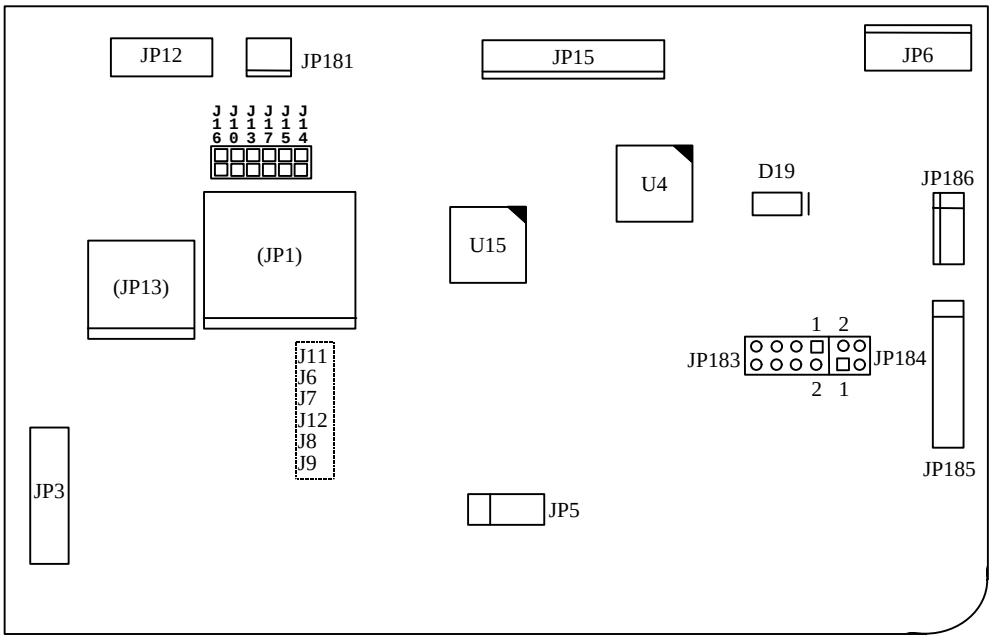
Function in COM1	JP8 settings
Pin9: +5VDC	1-2 short ★
Pin9: RI	2-3 short

COM2 DC select

Function in COM2	J12 settings
Pin1: DCD	5-6 short ★
Pin1: +12 VDC	4-5 short
Pin9: RI	2-3 short ★
Pin9: +5 VDC	1-2 short

PROGRAMMABLE KEYBOARD

CONTROL BOARD LAYOUT



CONNECTORS

Connector	Connect to
JP 1	PC AT keyboard
JP 3	6 position electronic key-lock
JP 6	Membrane through the narrow tongue
JP 12	I/O board for external connection
JP 13	PS/2 keyboard
JP 15	Membrane through the broad tongue
JP 181	Power LED
JP 185	MSR head
JP 186	MSR LED

JUMPER SETTINGS

Jumper	Function	When shorted	When opened
J 13	Send code in	scan code	ASCII by Alt + Num ★
J 14	ISO Track 1 of MSR	enabled ★	disabled
J 15	ISO Track 2 of MSR	enabled ★	disabled
J 16	ISO Track 3 of MSR	enabled ★	disabled
J 17	Leading/Stop sentinel	disabled	enabled ★

The ★ mark means the default setting for the above items.

The Alt + Num function is very important for some non-English language application. The default setup of PST systems manufactured since 1997 is to enable the Alt + Num function, while the default setup of PST systems manufactured in 1996 was to disable the Alt + Num function. For the English application, the user may disable the Alt + Num function to improve the performance.

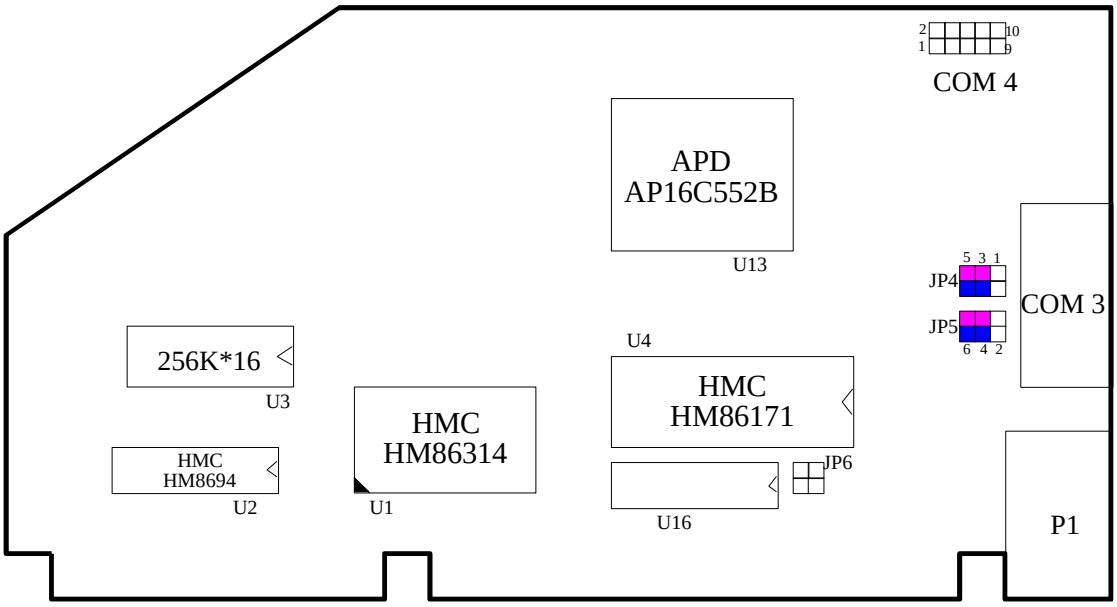
The start/end sentinel is defined by ISO7811: For track 1, start sentinel is "%" and end sentinel is "?". For tracks 2 and 3, start sentinel is ";" and end sentinel is "?".

MODIFICATION FOR MSR

Adding an ISO MSR

- Assemble the MSR head and connect it to JP 185.
- Assemble the bi-color LED and connect it to JP 186.
- Check the jumper settings of J17:
  Short: Start/end sentinel OFF Open: Start/end sentinel ON ★

VGA CARD (PST023)



The PST023 is the adapter card that supports VGA display, COM3 and COM4 for the CRT type PST systems. This card can also be added to the LCD type of PST systems as an option for obtaining 2 more serial ports and a monitoring VGA connector. At the lowest part on this card the P1 connector is a 3 x 5 pin D type female sub-miniature connector for the VGA display with +12V DC power supplied. In case this port is to be connected to any display device other than the original one supplied by the manufacturer, the possibility of short-circuiting due to this power supply must be carefully considered.

The COM3 serial communication port is a 9 pin D type male sub-miniature connector located above the VGA connector. The COM4 serial communication port is another 9 pin D type male sub-miniature connector on an I/O plate connected to a 2 x 5 pin header on the PST023 card. Both COM ports support +5V DC and +12V DC power individually.

The selection of these jumper settings is listed as the following:

		COM3		COM4	
		PIN 1	PIN 9	PIN 1	PIN 9
JP 4 :	1 - 3 short		+ 5V DC		
	3 - 5 short		RI		
	2 - 4 short	+ 12V DC			
	4 - 6 short	DCD			
JP 5 :	1 - 3 short				+ 5V DC
	3 - 5 short				RI
	2 - 4 short			+ 12V DC	
	4 - 6 short			DCD	

The default settings for JP 4 and JP 5 are both 3-5, 4-6 short.
IRQ 9 is used for COM3 and IRQ 5 is used for COM4.

SERVICE AND SPARE PARTS

SERVICE GUIDE

OPENING THE KEYBOARD

Whenever there comes to a need for service or maintenance or upgrading, there may be the need for opening the PST system and having an access to the interior of the cabinet. The method to access the interior of a PST system can be divided into following steps: removing the exterior peripherals, opening the programmable keyboard, detaching the rear cabinet and dissociating the required parts/module from the chassis.

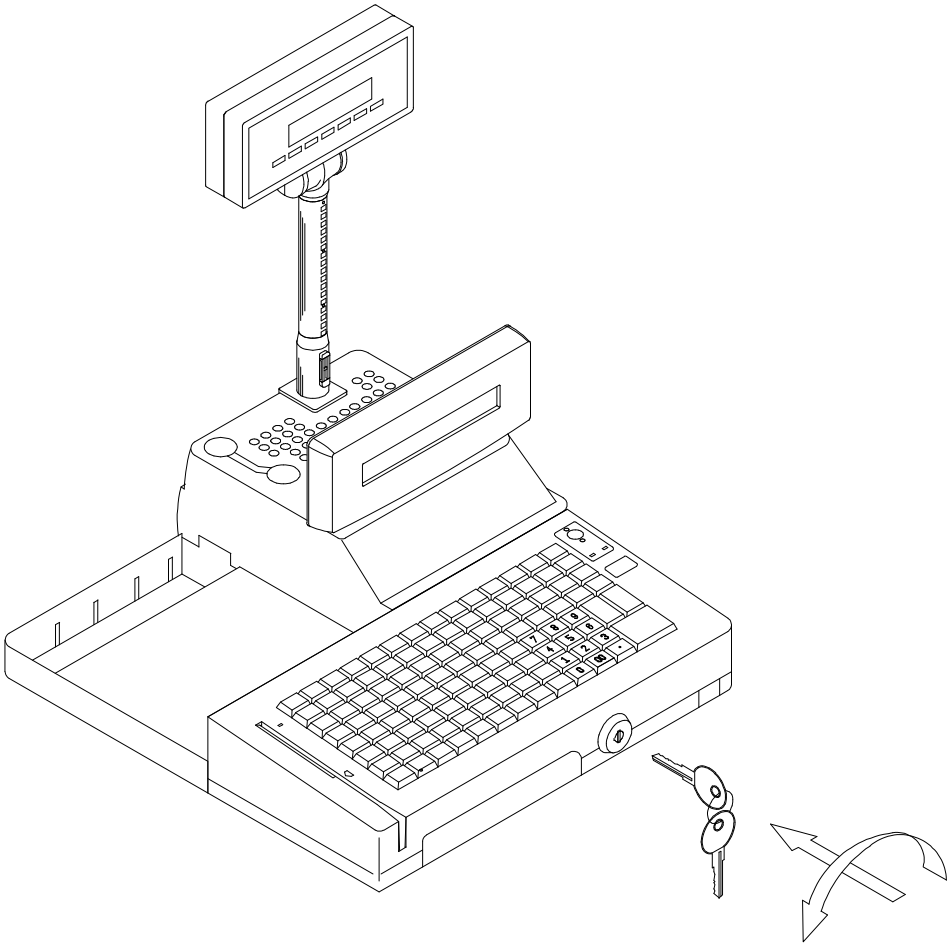
The possible exterior peripherals attached to the PST system may include external KB wedge device, printer, CRT or LCD display, VFD customer display and some devices connected to the I/O ports of PST system such as cash drawers, laser scanning devices etc..

Before breaking or making any connection or opening any device or the PST system, please always make certain that all the power for each and every device involved are turned off and the power cords are removed.

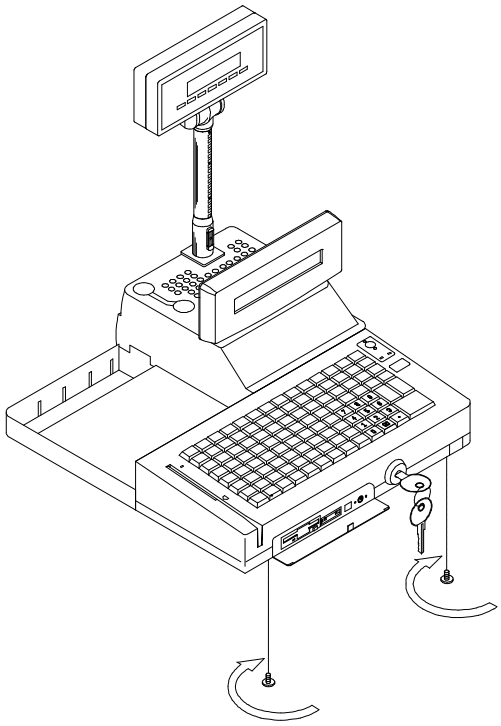
Should there be any device connected to the area inside the front door such as a KB wedge device or a PC keyboard, all these devices should be disconnected from the PST system first. Use the mechanical key to open the front door (see DWG.-1). If this key is lost somehow, the user should request for replacement of the same mechanical lock. Unscrew two screws at the bottom side of PST near the front bottom corners (see DWG.-2) and the user may now lift the programmable keyboard unit by the front bottom edge of the keyboard unit as shown in the following drawing DWG.-3 on page 7 - 3.

There are three cables to be disconnected from the keyboard unit before the unit can be completely taken away from the major part of PST system. The user should disconnect the cable coming from the external keyboard connector or through an intermediate cable of the internally connected KB wedge device if assembled in accordance with the instructions given in the User's Manual; a four wire cable

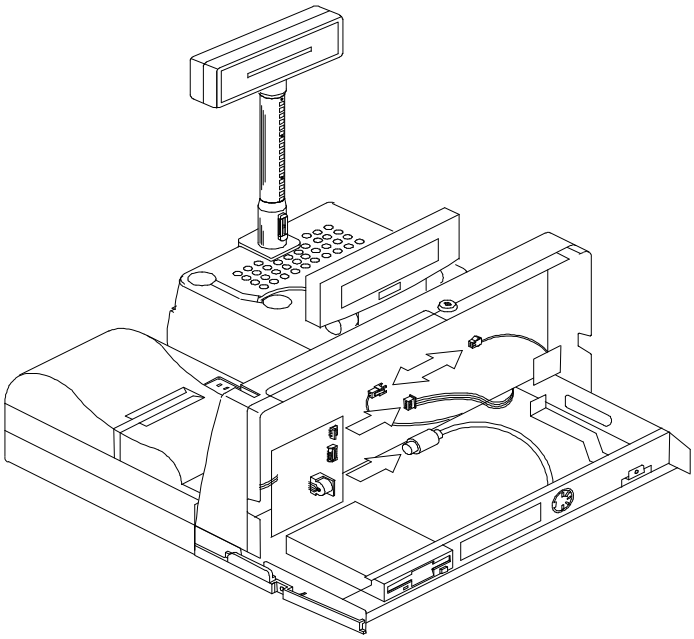
connecting to the KB CPU board from somewhere near the power supply unit; an intermediate socket connecting to the LED on the programmable keyboard unit. Then the keyboard unit can be taken away and put aside. However, to prevent a messy situation for reinstallation later on, the two (or one if an internally connected KB wedge device exists) cable stopper from both sides of the bottom chassis should be taken out and kept well (see DWG.-4).



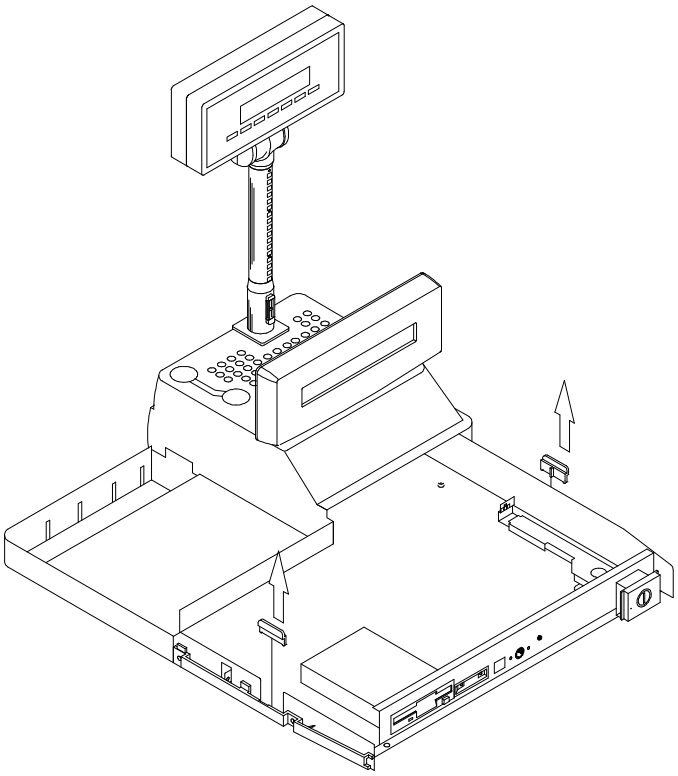
DWG. - 1 Unlocking front door



DWG. - 2 Unscrewing the bottom



DWG. - 3 Lifting the keyboard unit



DWG. - 4 Taking the cable stoppers out

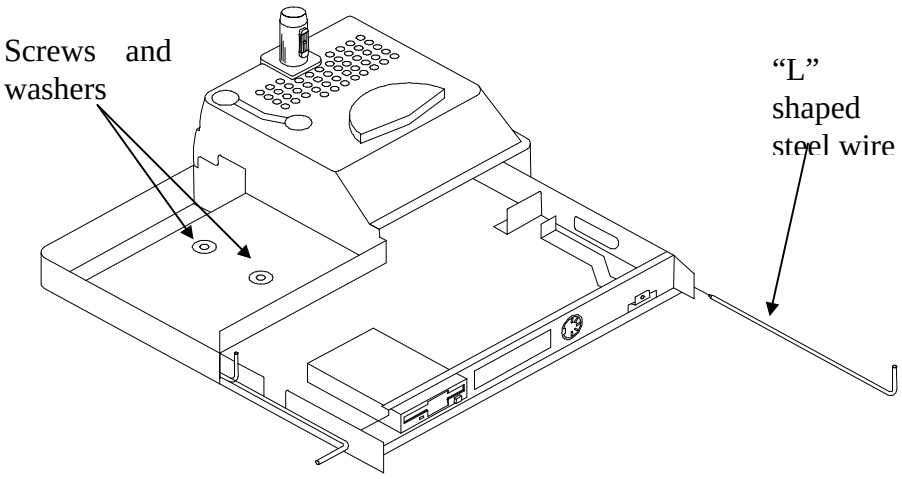
DETACHING THE REAR CABINET

Before detaching the rear cabinet of the PST system, all the external devices should be removed. Disconnect all the connectors in the rear room within back cover. Refer to the installation instructions in User's Manual (take opposite operation in reverse order) for detaching CRT or LCD display, printer, VFD and if installed, the built-in battery.

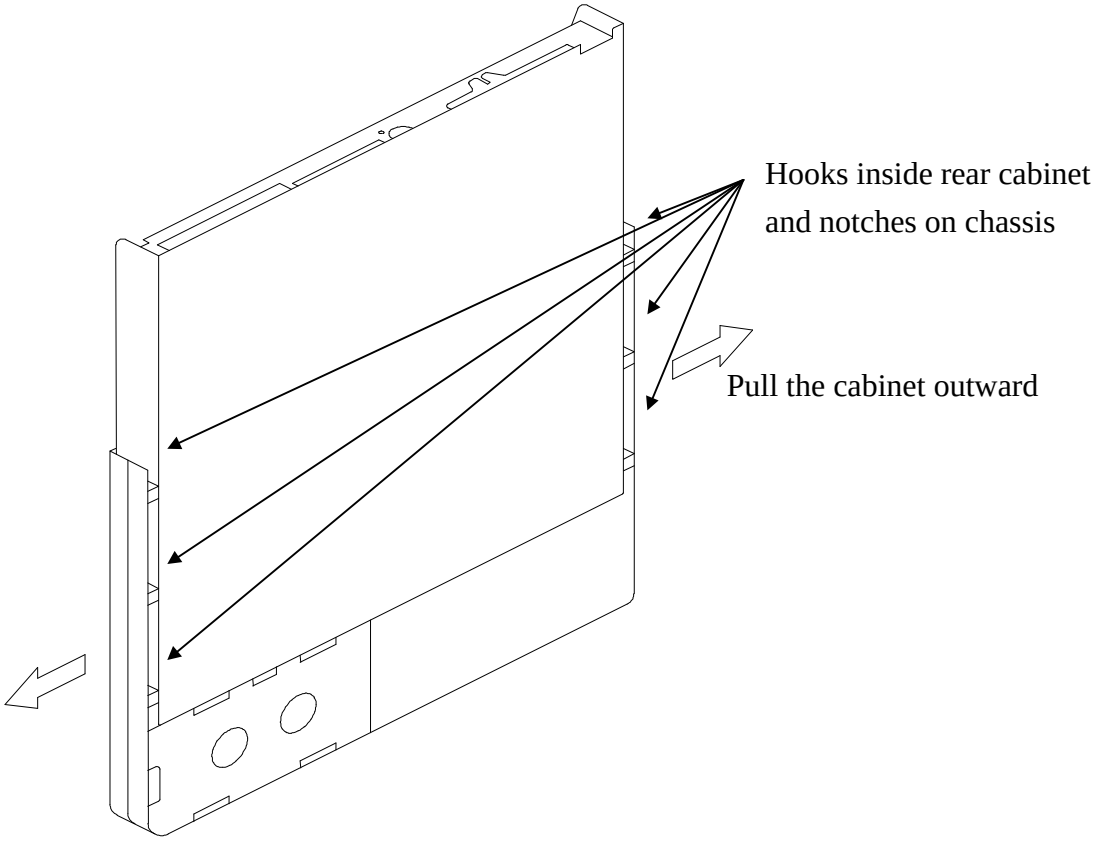
Look into both sides of the PST chassis, with reference to the following drawing, the user should find a "L" shaped steel wire at each side binding the rear cabinet to the bottom chassis. Of course, only the short arm of the wire is visible from the side that was covered by the side wall of the keyboard unit just removed. Turn the short arms outward by 90 degrees (they were pointing upward) and pull the wires toward the front till the long arms come out (see DWG.-5). Unscrew the two screws and take out the washers on the printer platform to get ready to take the rear cabinet off.

Now, the user would like it better to do the next operation with the PST system up side down, though it is still possible for some skillful person to do it without turning the PST. The drawing shows the bottom side of the PST system. The purpose is to detach all the hooks from their notches. There are three notches on each side wall of the bottom chassis and there are correspondingly three hooks at the inside of each side wall of the rear cabinet. The key issue is to detach the hooks by pulling the side walls of the rear cabinet a little bit outward yet still within the limit of the elasticity of the cabinet (see DWG.-6). It is normal to have the rearmost pair of hooks more difficult to get out than the others in this operation. Then the cabinet can be put aside and the PST turned back to normal position.

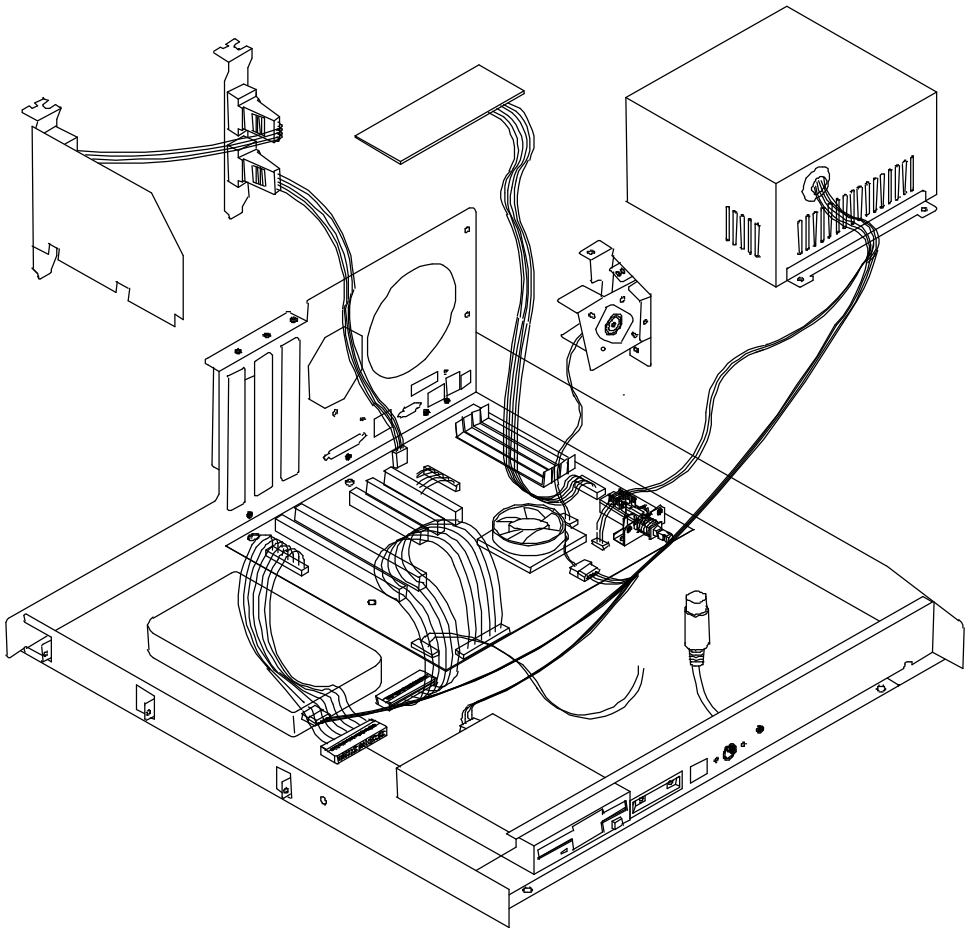
Refer to the drawing for cable connections within the PST system and disconnect those necessary for taking out the module that needs to be replaced (see DWG.-7).



DWG. - 5 Turning the "L" shaped wire outward and pull out



DWG. - 6 Detaching hooks from notches



DWG. - 7 Cable connections inside PST system

SPARE PARTS/MODULE LIST

At the last page of this chapter, the assembly drawing of the PST1000 series must have provided the reader of the Technical Manual an idea of the way to access each parts or module for service or upgrading purposes as required in the previous chapter(s). Every parts/module identifiable in the drawing are listed below, please note that all available choices of each location are listed to cover the whole product range of PST1000 series and parts at some location could be a subset of some module at other location (e.g. item XXXX is contained in item YYYY).

Item	Part Number	Description
1010	PST9MVPWAU01N	9” DC monitor, northern hemisphere
1011	PST9MVPWAU01S	9” DC monitor, southern hemisphere
1012	AMT10C26TV02N	10” color monitor, northern hemisphere
1013	AMT10C26TV02S	10” color monitor, southern hemisphere
1020	PST9BASEMSM	Monitor swivel base mechanism
1030	OD300	OD300 display module with cable
1040	PSTCVRCRT	Rear cabinet, CRT type w/o pole base
1041	PSTCVRLCD	Rear cabinet, LCD type w/o pole base
1050	PD101	Customer display 8 x 7 segment + 7 LED
1051	PD201	Customer display 2 x 18 LCD
1052	PD2101	Customer display 2 x 20 VFD
1053	PD7001	Customer display graphic LCD (English)
1054	PD7011	Customer display graphic LCD (GB Chn)
1055	PD7021	Customer display graphic LCD (Big 5)
1060	PSTLCDBLCVR	LCD cable cover
1070	PSTCRTRODCVR	LCD cable cover, round shape
1071	PSTCRTLWROD	Pole base long type
1080	PSTLCDLWROD	Pole base short type
1081	PSTCRTCBLCVR	CRT cable cover
1090	PSTBTRYCVR	Battery cover
1100	PSTBKDRLH	Back door with latch

(continued 1)

Items	Part Number	Description
1110	CBT12VLA	12 V 2.3 AH UPS battery
1120	ASPOP200W TE006	ATX Power supply
1130	PSTBKCHASS	Back plastic chassis
1140	PST023	VGA card w/ COM3 & COM4
1150	A389-4	4MB SIMM module EDO DRAM
1151	A389-8	8MB SIMM module EDO DRAM
1160	PST100-2M	SSD module 2MB
1161	PST100-4M	SSD module 4MB
1162	PST100-8M	SSD module 8MB
1170	PST888G	486 system board module
1180	HCT-40TC-3	Cooling fan with heat sink
1190	CIC486DX4100-ST	CPU 486DX4-100 ST
1200	AHDD850MSEA	HDD 850 MB
1201	AHDD1.2GBSEAGT	HDD 1.2 GB
1202	AHDD2.1GQTM	HDD 2.1 GB
1210	CCBLA-148C	HDD cable
1220	CCBLA-149C	FDD cable
1230	PSTSPACRCVR	Left/Right cable stopper
1240	PSTSPACR-L	Left plastic bracket
1250	AFDD1.4MTEIV	FDD 1.44MB
1260	CCBLA-147A	External KB cable connector assembly to KB controller
1270	PSTMAINCHASSY	Chassis kit
1280	PSTLCKROD	L-shape locking stick
1290	PSTSPACR-R	Right plastic bracket
1300	PSTSWLEVELA	Power switch level with adapter & knob
1310	PSTSWBRKT	Power switch level cover
1320	CCBLA-230	UPS battery cable
1330	PST054A1K	UPS battery connector board
1340	PSTSPKASSY	Speaker with bracket

(continued 2)

Items	Part Number	Description
1350	CCBLA-227A	I/O cable with plate (COM2)
1351	CCBLA-227B	I/O cable with plate (COM4, COM2)
1360	PSTCHASSISEMI	PST EMI kit (must be with item 1040 or 1041)
1370	CCBLA-152	MSR LED, (Dual color) with cable
1380	PSTKEYPAIR	Single key top & key cap pair
1381	PSTDBKEYPAIR	Double key top & key cap pair
1382	PSTQDKEYPAIR	Quad key top & key cap pair
1383	BK-2000	KB3100 blank key
1384	TK-2000	Ten key set
1390	CCBLA-167-2	Stand by LED, (Yellow) with cable
1400	PSTKB112	Stroke type keyboard w/o MSR
1401	PSTKB112MR2	Stroke type keyboard with 2 track MSR
1402	PSTKB112MR3	Stroke type keyboard with 3 track MSR
1403	PSTKB112MRJS2	Stroke type keyboard with JIS II MSR
1410	PSTKB112EKEY	4 Keys set for 6 position key lock
1420	PSTKBELCK6PASY	6 Position key lock with wafer assembly
1430	CCBLA-151	Power LED, (Green) with cable
1440	PSTKBMECHKEY	Keyboard front door key
1450	PSTKBDR-1	Keyboard front door
1460	CCBLA-150C	Internal KB cable from system board to KB controller
1470	PSTKB112CPUMR	Keyboard controller
1480	CMSRCATRIGE-2	MSR module 2 tracks
1481	CMSRCATRIGE-3	MSR module 3 tracks
1482	CMSRCATRIGE-4A	MSR module JIS II

ASSEMBLY DRAWING